METRA
Energie-Messtechnik
Member of Bopp & Reuther Messtechnik Group

Measuring System „autarkon®“
EDZ 1x0 / EWZ 1x0

Mounting, Commissioning and Service Instructions

EDZ 1x0 / EWZ 1x0

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1. General Description

1.1 Adequate Usage

The EDZ 1x0 / EWZ 1x0 is usually equipped with a compact orifice plate. It serves for the determination of the flow and energy of vapors and fluids.
The technical data shown on the nameplate as well as in chart 1 are relevant for the usage.
The usage must agree with the order specifications.
A usage differing from the adequate usage mentioned above is not admissible.

1.2 Transport, Delivery, Storage

Storage and Transport
Ambient Temperature 0 – 50°C
The devices have to be protected against wetness, humidity, pollution (soil), blows and damages.

Checking the delivery
At reception, the shipment has to be checked for completeness. The data of the device have to be compared with the delivery notes and the order documents. Damages due to the transport have to be forwarded immediately after reception of the shipment. Damages determined at a later time cannot be acknowledged.

1.3 Warranty

The extent and the period of the warranty can be derived from the contracted delivery conditions.
A claim of warranty requires professional mounting and commissioning according to the valid mounting, commissioning and service instructions.
The required mounting, commissioning and service work may only be carried out by trained and authorized personnel.

Return deliveries have to include the original or an equivalent packaging.

1.4 Technical Data

Nominal Width	DN	see nameplate
Measuring Range		see nameplate
Nominal Pressure		see nameplate
Admissible Operating Pressure		see nameplate
Admissible Operating Temperature		see nameplate
Medium		see nameplate
Ambient Temperature		see nameplate
Temperature Input		see nameplate
Auxiliary Supply		24 V DC/AC -10% +15%, Power Consumption 15 VA
Display (Option)		Multi-functional LC display
Output Analog		1 x 4-20 mA
Output Digital		M-Bus Interface
Output Opto-coupler		2 x Optoelectronic coupler 5 – 24 V 10 mA
Material		Parts in contact with the medium are of stainless steel
Protection Class		IP 65

Admissible Pressure Differential Transmitters:

The EDZ 1x0 / EWZ 1x0 is normally equipped with a compact orifice plate.

However, other types of pressure differential transmitters can be adapted as well.
- ISA nozzle, venturi nozzle, Venturi pipe
- Cross-section orifice plate

The required adaption of the pressure differential transmitter take place directly at the mounting location with the respective software.

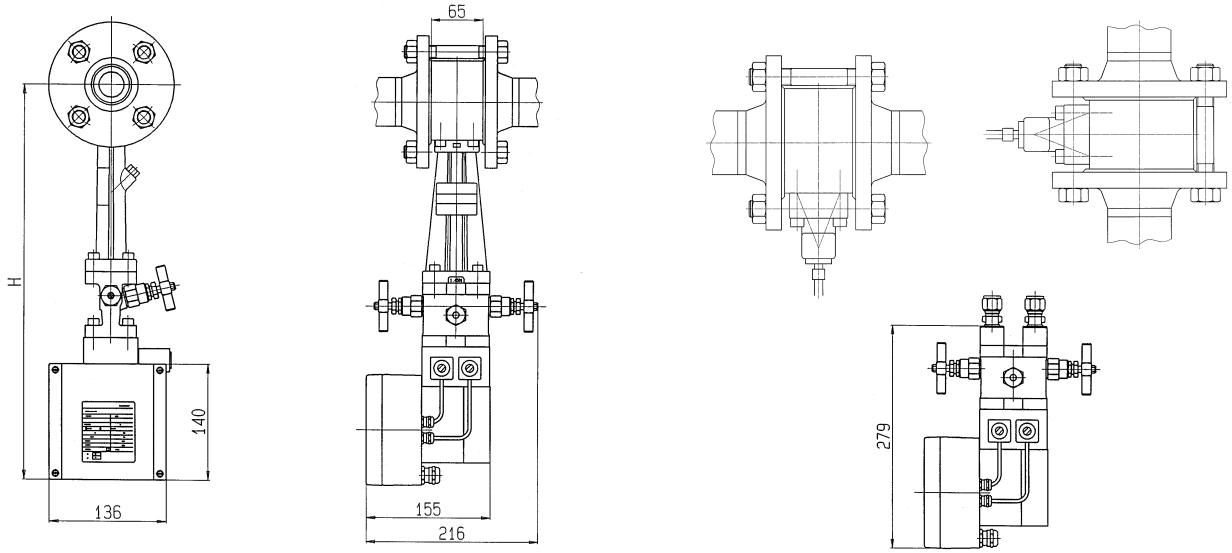
Other pressure differential transmitters like
- Prandtl / Pitot pipe
- Itabar / Deltabar orifice plate
- V-Cone

can also be adapted. For such measurements, the electronic device has to be configured at the factory.

!! Caution !!
If pressure differential transducers other than the described compact orifice plate and the cross-section orifice plate are used, the respective operating instructions have to be observed.

1.5 Dimensions

compact design **remote design**



Dimensions of compact transducer

DN	15	20	25	32	40	50	65	80	100	125
H (mm)	465,3	463,6	469,5	475,3	483,8	480	491	499	511,6	525

Connection of measuring pipes

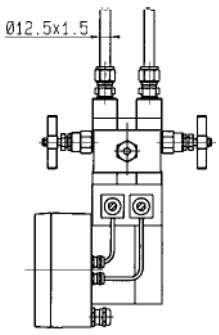
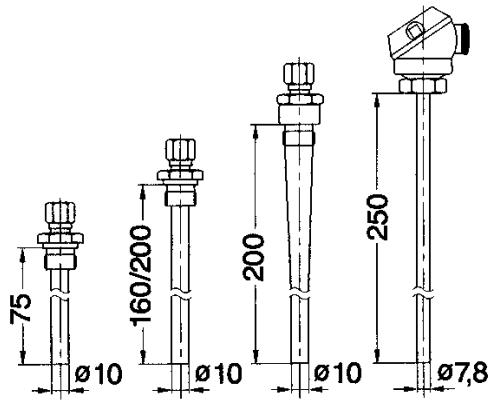


Figure 3: Connection of the measuring pipes (remote design)

Temperature sensors with immersion pocket



Welding-type immersion pocket
Screw-type immersion pocket

If using other temperature sensors / immersion pockets than the METRA standard types, the respective mounting instructions have to be observed.

2. Mounting

2.1 Safety Hints

Prior to mounting and commissioning, these mounting, commissioning and maintenance instructions have to be read and observed.
The safety regulations valid for the mounting location have to be regarded.

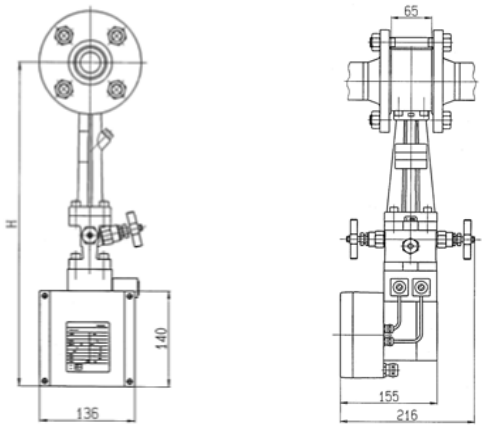
Warning

Prior to mounting / demounting the measurement transducer, the system has to be **depressurized** and **cooled down**.

2.2 Mounting location, orientation (compact device)

The measurement transducer can be installed in horizontal and vertical pipelines.
For vertical mounting, only the separate version can be used.
The EDZ 1x0 / EWZ 1x0 is to be installed hanging downward.

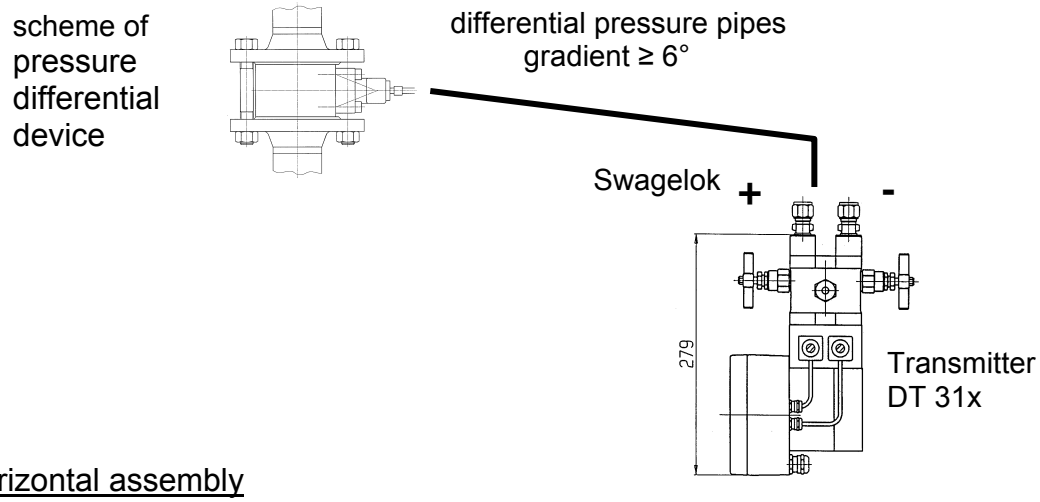
Compact Transducer



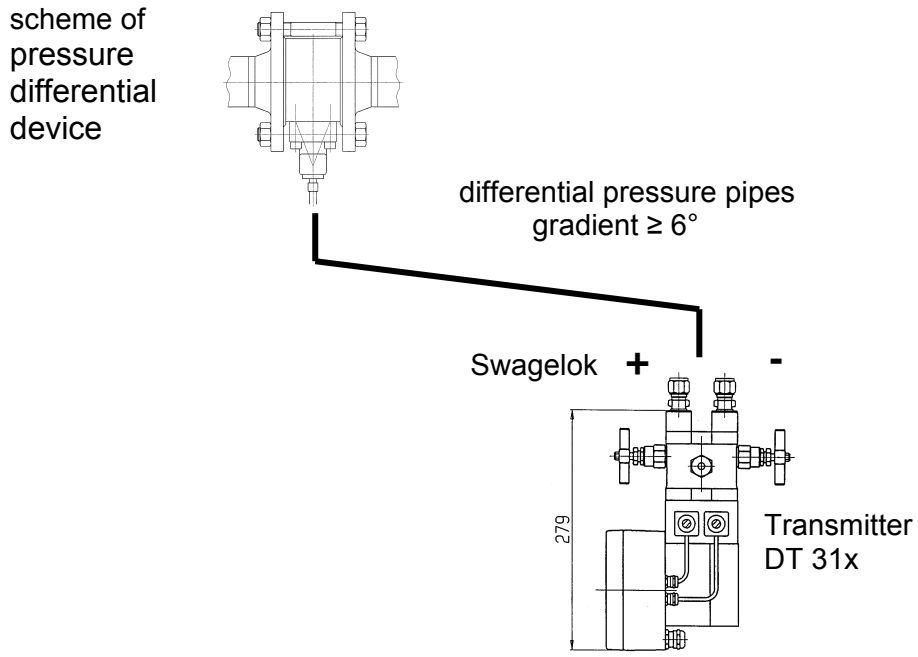
Mounting location, orientation (separate version)

The EDZ 1x0 / EWZ 1x0 is to be mounted according to the following measurement orientations. The orientations marked by asterisk are preferred.
Please ensure that the differential pressure pipes are ascending from the transducer to the calculation unit by at least 6°.

vertical assembly



horizontal assembly



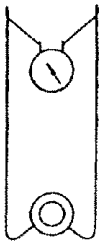
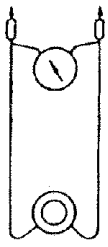
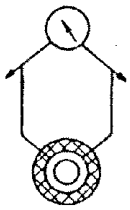
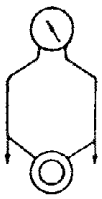
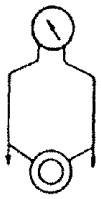
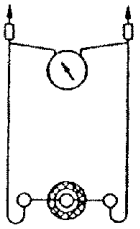
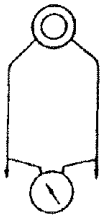
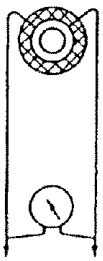
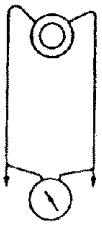
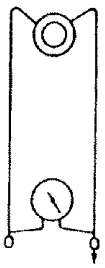
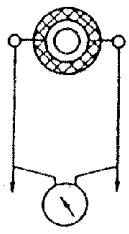
Absolutely important!

If mounted in the open, measures against freezing of the medium in the differential pressure pipes as well as the transducer have to be taken. Disregarding of this warning can lead to the damaging of the transducer.
No warranty.

Pressure measurement

If steam or condensing gases are to be measured, the hydrostatic pressure of the water column resting on the pressure transducer caused by the mounting can disturb the measurement.
The water column resting on the pressure transducer has to be compensated.

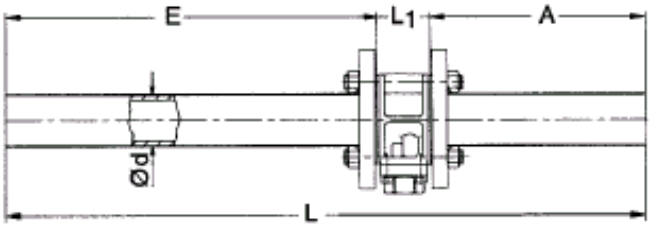
Possible Orientation of the Measurement in the Differential Pressure Technology

State of the medium to be measured	fluid			gaseous (gases and steams)		
State of the filling in the differential pressure pipes	fluid	partially gaseous	completely evaporated	gaseous	partially condensing	completely liquefied
Examples	condens. water	boiling water	fluid gas	dry air	damp air	water vapor
Differential pressure measuring device above throttle	 *		 *			
Differential pressure measuring device below throttle	*				 *	

*The orientations marked with an asterisk are to be preferred.
In case of vertical mounting of the differential pressure transducer, the pressure taps at the transducer have to be installed at the same hydraulic level, especially if vapor is to be measured.

Inlet and Outlet Pipe Sections

For exact centering of the measuring ring it is recommended to use METRA centering flanges with upstream- and downstream straight length including accessories as bolts and gaskets.
If the upstream and downstream lengths are not supplied by METRA, please ensure that the internal diameter exactly corresponds to the diameter „d“ of our compact orifice.
The compact orifices are according to pressure rating PN40.
Attention!
In case of pipe reductions/extensions please make sure that they are carried out concentrically.



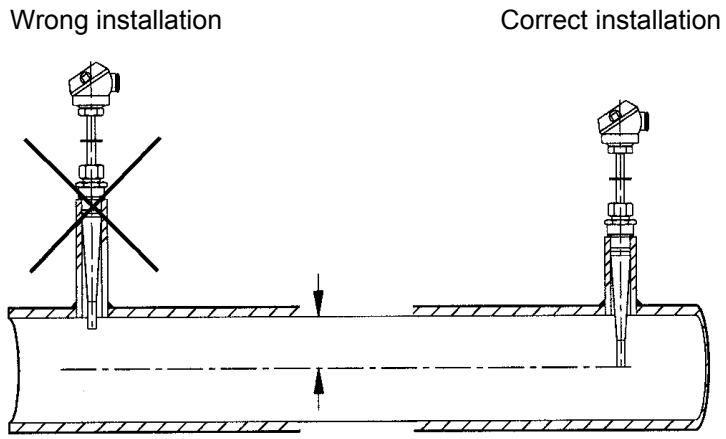
Diameter	Flange
DN 15 to DN 50	PN16, PN25, PN40
DN 65 to DN 125	PN25, PN40

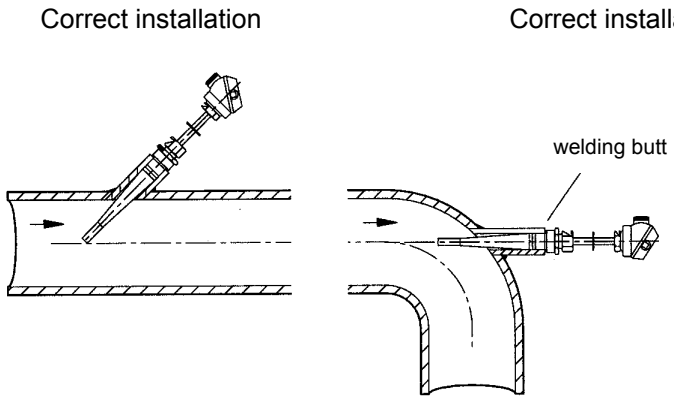
Diameter	DN	15	20	25	32	40	50	65	80	100	125
L	(mm)	500	550	600	700	750	1000	1200	1400	1800	2200
E	(mm)	265	300	331	404	437	621	751	891	1151	1421
A	(mm)	166	181	200	227	244	310	380	440	580	710
Int. diam. d	(mm)	17,3	22,3	28,5	37,2	43,1	54,5	70,3	82,5	107,1	131,7
L1	(mm)	65 mm + 2 x 2 mm gasket									
Press. rating		PN 40									
Weight	(kg)	2,5	3	4	5,5	6,5	9	14	18	27	41

Caution!
The length of the inlet and outlet pipe sections is always dependent on the inlet disturbance and the opening ratio of the orifice plate.
It is strongly recommended to observe ISO 5161-1 to ISO 5161-4.

2.3 Mounting the Temperature Sensors

The immersion pockets of the temperature sensors are screwed into the respective welding-type sleeves R1/2“. If welding-type immersion pockets are used, these may only be welded to the welding-type sleeve at the welding band.
Please observe the necessary immersion depth (approximately to the middle of the pipe). The temperature sensors are put into the immersion pockets and secured using the cap nut.





If using other temperature sensors / immersion pockets than the METRA standard types, the respective mounting instructions have to be observed.

2.4 Installation

The pipeline is to be flushed prior to the installation.

Mechanical stress of the pressure differential transducer caused by the pipeline is not admissible.

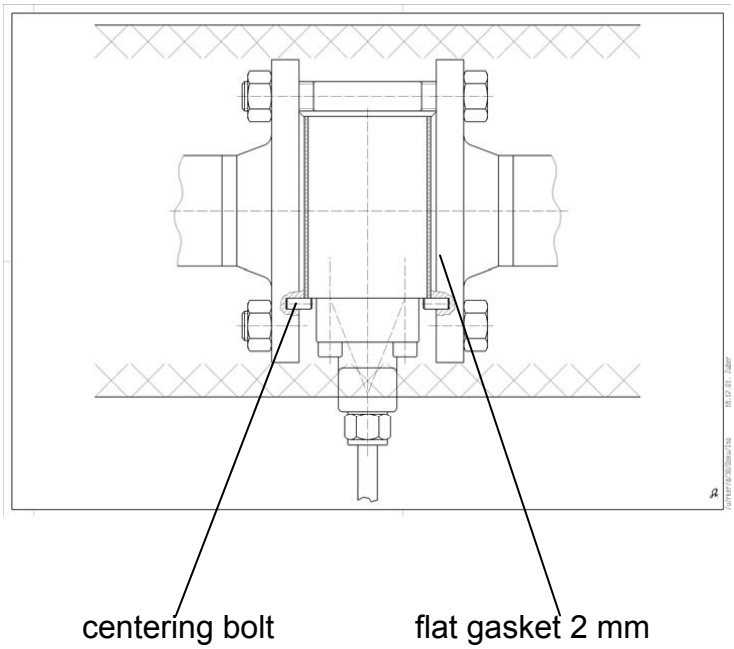
The gaskets used must be suited for the medium, the maximum temperature and the maximum pressure.

The inner diameter of the gasket may not be smaller than the inner diameter of the transducer.
The gasket may not project into the pipeline.

The connection of the pressure differential pipes to the measuring transducer and the transmitter have to be fitted according to the following descriptions. Please make sure that the transmitter is filled with water prior to the installation of the differential pressure taps.

If a measuring station is to be installed, the description of the measuring station has to be read in addition to this description.

After the installation, the system has to be checked for tightness.



Only in connection with METRA compact measuring orifice plates and METRA inlet and outlet pipes

3. Commissioning, Operation

3.1 Electrical Connection

> **Caution**
> The electrical connection of the device may only be carried out by electrically trained workers.
> During the connection, the power supply has to be switched off.

3.2 Electrical Connection

- Install the wires for the power supply separately
- Use screened cable for the current output

1. Remove lid **A**
2. Insert cable via conduit **B**
3. Connect screen **C** for the current output to the conduit
4. Connect cable to the screw terminals (see connection diagram)
5. Fix lid

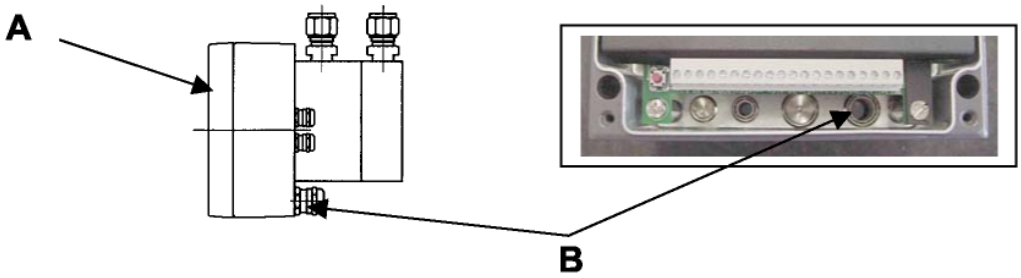


Figure 6: Electrical Connection

Figure 7: Screen connected to conduit

Connection Diagram EDZ 1x0 / EWZ 1x0

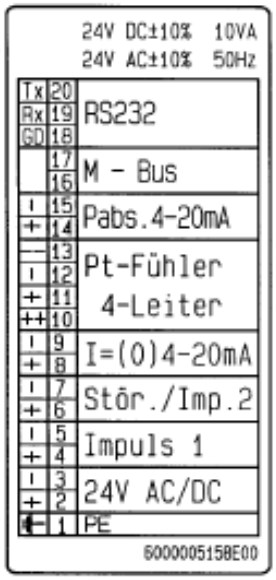


Figure 8: Connection Diagram EDZ 1x0 / EWZ 1x0

Standard adjustment for EDZ 1x0

Pulse 1 = Mass Flow

Pulse 2 = Error Message

Current Output 4 – 20 mA = Mass Flow or Volume Flow, respectively

Standard adjustment for EWZ 1x0

Pulse 1 = Mass

Pulse 2 = Energy

Current Output 4 – 20 mA = Mass Flow or Volume Flow, respectiively

Caution! Very important for Heat Meter Version EDZ 1x0 / EWZ 1x0!

Only one temperature sensor can be connected.

This can be a Pt 500 (built-in temperature sensor), a Pt 100 or a Pt 1000 in four-wire technology.

The reference temperature (normally return temperature) is factory-adjusted according to the customer´s data. It can only be changed with a special software.

If the customer does not denote the reference temperature, the factory–adjusted value will always be **0°C** .

3.2 Commissioning / Deactivation

Caution: Danger in steam and heating water installations!

Can lead to serious burnings.
Please ensure that all filling and draining bolts are tightliy fitted.

Proceeding:

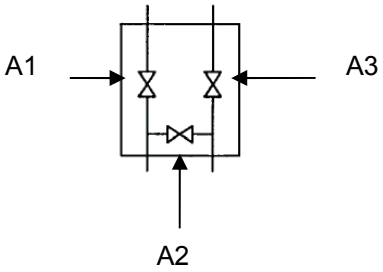
- **Put plant out of operation and close shut-off valves**
- In steam and hot water applications, the transducer may not be in direct contact with the medium.
- Prior to commissioning of the plant, please fill the measuring taps and the transducer with water according to the following instructions.
- Apply power supply.
- Adjust the valve at the shut-off module (option) as follows (see fig. 1)
- Open valve A1, open valve A2, open valve A3.
- Open evacuation bolts E1 and E2 slightly. (see fig. 3)
- By means of a spray bottle, fill in enough clean condensate into the orifices (F1, F2, see fig. 2)
- Close evacuation bolts E1 and E2, as soon as transducer is filled with water (see fig. 3).
- Fill differetial pressure pipes with water.
- Close F1 and F2.
- Remove cover of the transducer DT 311 / DT 312
- Press zero-balancing button twice (the solenoid valve in the measuring head is oppened thereby, i.e. the measuring chambers are short-circuited (see fig. 4)
- Adjust valves at the shut-off block (option) as follows (see fig. 1):
- Open valve A1, close valve A2, open valve A3
- Press balance button twice (see fig. 4)
- Put plant into operation and open shut-off valves.
- Wait for continuous flow
- Check displayed values

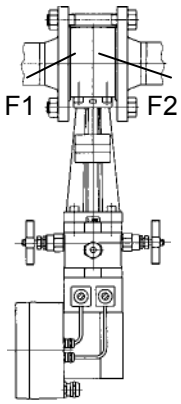
Please regard: Read additional description of the measuring station, if appropriate.

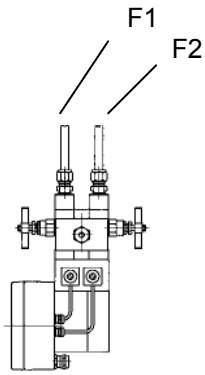
Commissioning

Compact device **Separate version**

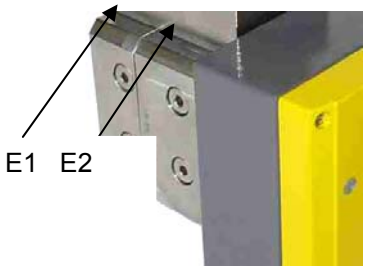
Shut-off module



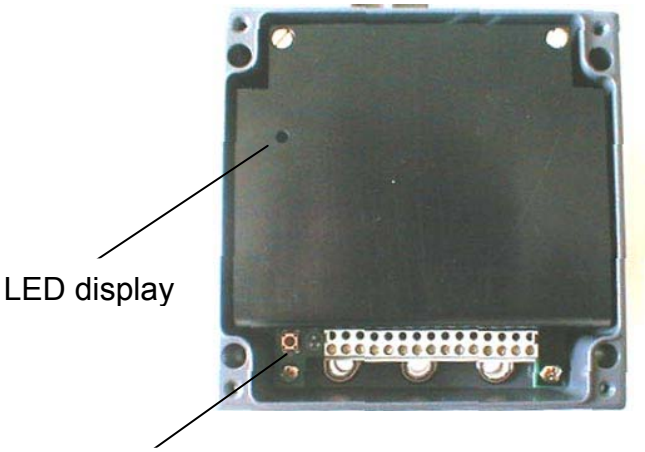




DT 311 / DT 312



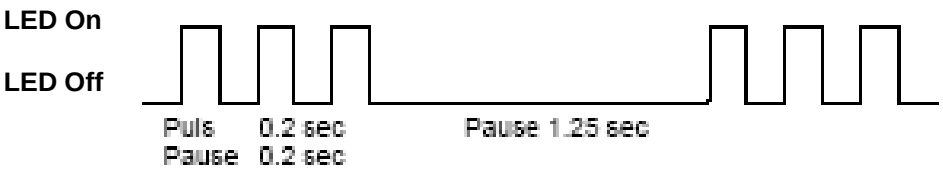
DT 311 / DT 312



Checking the evacuation

By means of the LED display, the evacuation procedure can be checked.

LED display
After the evacuation (plant closed, no flow, valves A1, A3 shut and valve A2 open), the LED display may show max. 3 blinking pulses for two times after pressing the balance button:

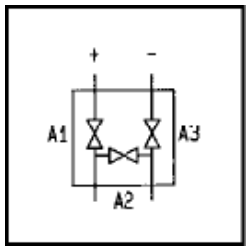


At higher frequencies, the evacuation process has to be repeated according to section 3.2.

Deactivation

Compact Version
Prior to removal, the plant (measuring device) has to be depressurized.

Version with Shut-off Module
Close valevA1
Open valve A2
Close valve A3
Regard the order

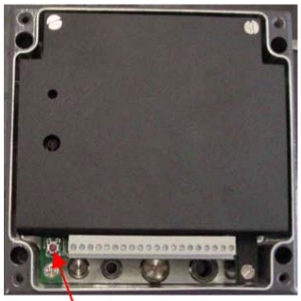


3.3 Zero-balancing

After the cover of the electronic part has been removed, the button for the zero-balancing can be pressed.

The zero-balancing is responsible for the self-calibration of the transducer.

CAUTION!!! Only press button following the instructions below, otherwise the zero-level can be shifted.



Button for zero-balancing

Without solenoid valve module
In order to be able to zero-balance the sensor, the volume flow of the measuring medium at the differential pressure transmitter has to be stopped to ensure that no differential pressure is applied to the sensor (differential pressure transmitter).
Now the zero-balancing button can be pressed.

Without solenoid valve module / with shut-off module
In this case, the plant may stay in operation. The zero-balancing of the sensor is activated by closing the valves A1 and A3 (as can be seen in the adjacent scheme of the shut-off block) and opening valve A2 (observe order).
Now the zero-balancing button can be pressed.
After the zero-balancing, the valves have to be put into the original position again (observe order, reverse order of opening).

With solenoid valve module
In this case, the system can stay in operation. Pressing the button once triggers the zero-balancing (the solenoid valves can be heard).
By pressing the button twice in fast sequence the solenoid valves initiate the evacuation mode. In this mode, the solenoid valves are alternately opened and closed (several clicks of the solenoid valves can be heard).

Function of the LED Display

The blinking frequency of the LED display is a measure for the pressure differential at the pressure differential sensor.

By means of this display, the correct function of the evacuation procedure can be checked.

Checking the evacuation procedure.

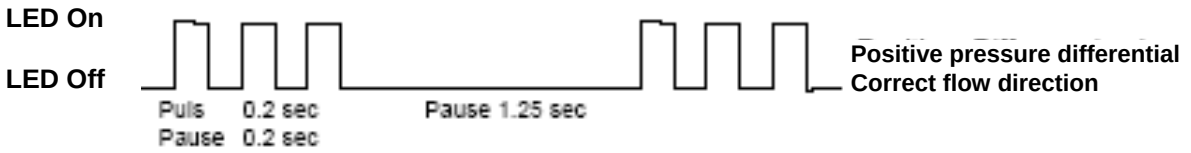
According to the table shown at the right side, the pressure differential can be derived from the frequency of the blinking pulses. The LED glows green. A red LED shows a faulty operation.

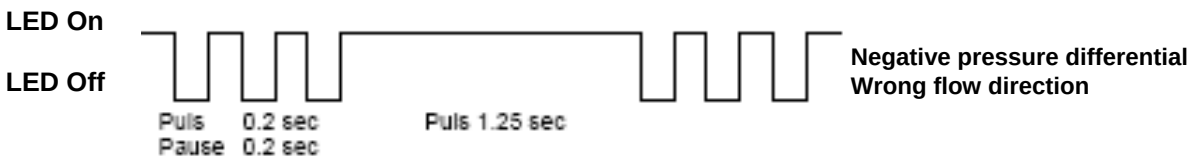
In this case, the evacuation has to be repeated.

If the fault indication continues, please contact the service personnel.

Δp / mbar	blinking pulses
≥ 2048	19
≥ 1024	18
≥ 512	17
≥ 256	16
≥ 128	15
≥ 64	14
≥ 32	13
≥ 16	12
≥ 8	11
≥ 4	10
≥ 2	9
≥1	8
≥ 0,5	7
≥ 0,25	6
≥ 0,125	5
≥ 0,0625	4
≥ 0,03125	3
≥ 0,015625	2
< 0,015625	1

The correct flow direction can be derived from the following LED switching cycles:





4 Display and Programming

4.1 Display Mode

The EDZ 1x0 and EWZ 1x0 can be equipped with a display function.
The display module is connected to the circuit board via a flat cable and mounted in the lid (cover) of the electronics casing.

Basic Functions

The basic function determines the main characteristics.

The following main functions are available:

- Differential pressure transmitter (DT 310/311/312)
- Volume/standard volume/mass flow meter (EDZ 1x0)
- Energy meter (EWZ 1x0)

According to the main function, many of the unused parameters are deactivated.
The measuring device is factory preset as follows, if no special customer´s requirements apply:

Operating Mode Differential Pressure

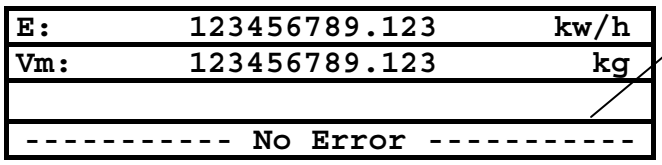
dp	350,13	mbar
---------- No Error ----------		

Operating Mode Volume, Standard Volume, Mass Flow Meter

Vm:	123456789.123	kg
qm:	1234.123	kg/h
---------- No Error ----------		

Display alternating
T: 130.02 °C
p: 14.12 bar
dp: 350.050 mbar

Operating Mode Energy Meter



Display alternating
P: 350.123 kW
qm: 123.123 kg/h
Tw: 180.021 °C
Tk: 10.000 °C
(fixed value)
p: 5.12 bar
dp: 350.123 mbar

Caution: Please regard

A subsequent change of the display mode can only be carried out with the respective software.

A1 Error Messages

Error text	Code (HEX)	Possible cause	Effect
Overload	0001	The maximum pressure differential of the sensor has been exceeded.	dP = 2* dP-Nom Error message if activated
ZLW	0002	Counters not initialized (new device) Error in EEPROM	Counters remain still
Zero-balancing	0004	Offset > 50 mbar Solenoid valve untight or defective	Offset=0 dP is calculated without offset correction
HW: Pressure	0008	Electronics defective	Calculation continues with default value
HW: Temp	0010	Electronics defective	Calculation continues with default value
dP	0020	Sensor defective	dp=0, Thead=0
Thead	0040	Head temperature exceeds preset value. NC valve defective.	Flow = 0 NO valve switches
Password	0080	Wrong password	Parameters cannot be changed
ADC	0100	Electronics defective	
EEP	0200	Parameter memory (EEPROM) defective	
dP Sensor 1	0400	Sensor cannot be read, wrong checksum or stored and read data do not match.	Calculation based on stored values
Imp. max	1000	Overflow of the intermediate memory for the pulse output. Wrong pulse factor.	
Temperature	2000	Short-circuit or of the temperature sensor. T > 550°C oder T < -50°C	Calculation continues with default value
Pressure sensor	4000	Pressure sensor is chosen but not connected or the current remains under 3,5mA. No pressure sensor connected or no default value in case of gaseous media. Link between terminals 14 and 15 is missing.	Calculation continues with default value
Mathematics	8000	Inadmissible parameters	undefined

6 Opto-coupler Output

Optoelectronic coupler

Scheme

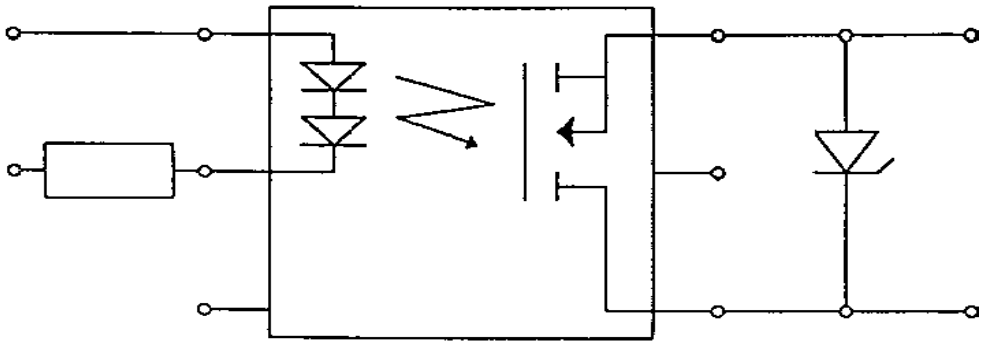


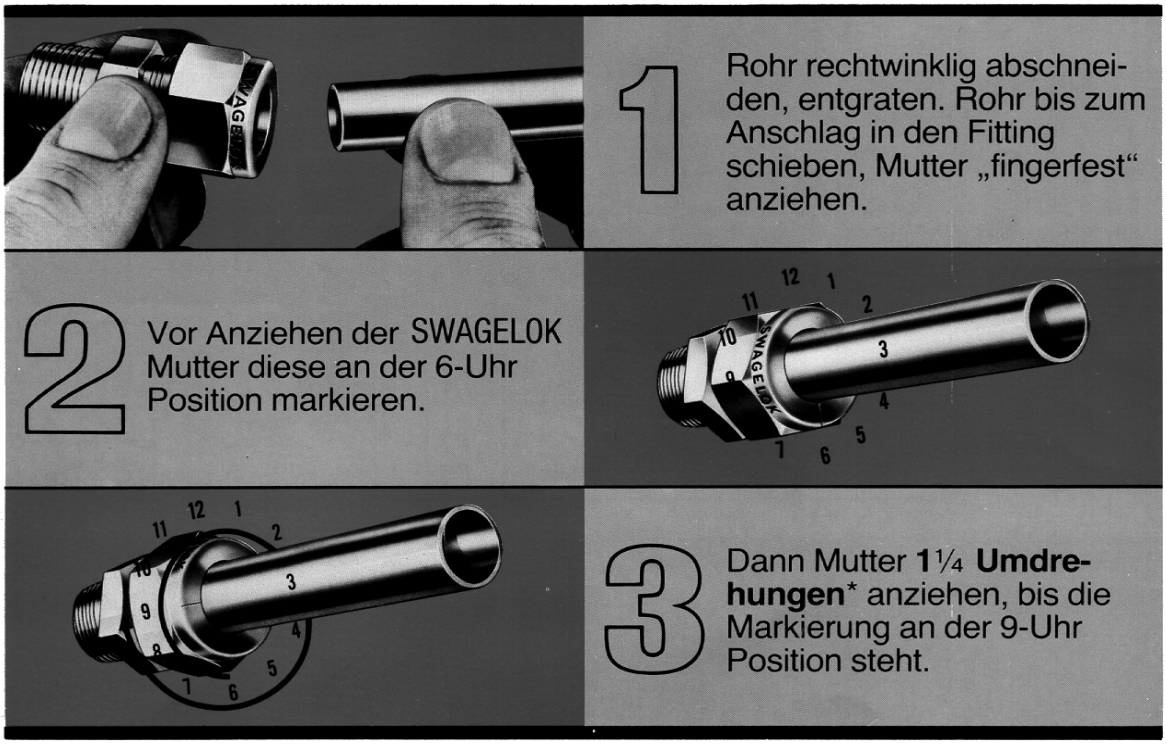
Figure: Optoelectronic coupler

Min. pulse width	:	10 ms
Min. pause	:	10 ms
Max. frequency	:	50 Hz
Max. voltage	:	30 VDC
Max. current	:	100 mA
Max. inner resistance	:	20 Ohms

7 Mounting Instructions for Tube Fittings

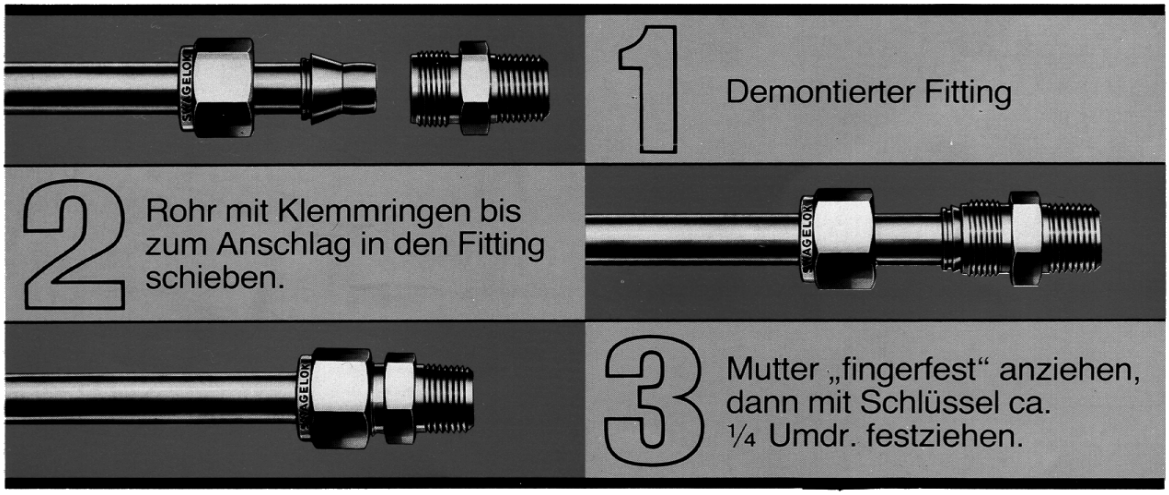
MONTAGEANLEITUNG FÜR Swagelok® ROHRVERSCHRAUBUNGEN

ERSTMONTAGE


1
Rohr rechtwinklig abschneiden, entgraten. Rohr bis zum Anschlag in den Fitting schieben, Mutter „fingerfest“ anziehen.
2
Vor Anziehen der SWAGELOK Mutter diese an der 6-Uhr Position markieren.
3
Dann Mutter 1¼ **Umdrehungen*** anziehen, bis die Markierung an der 9-Uhr Position steht.

* Für Verschraubungen der Größen 2, 3, 4 mm oder 1/16", 1/8", 3/16" müssen 3/4 Umdrehungen der Mutter bei der Erstmontage gemacht werden.

WIEDERMONTAGE


1
Demontierter Fitting
2
Rohr mit Klemmringen bis zum Anschlag in den Fitting schieben.
3
Mutter „fingerfest“ anziehen, dann mit Schlüssel ca. ¼ Umdr. festziehen.

Printed in Germany
5-96 WEL - MS-02-03G4

8 Conformity Declaration

The manufacturer
EU-DECLARATION OF CONFORMITY

Manufacturer

METRA Energie-Messtechnik GmbH
Am Neuen Rheinhafen 4
D-6734
6 Speyer

Declares under the sole responsibility that the product types

- Flow and energy meters -

EBR 1xx, EWZ 100/2xx/3xx, EDZ 37x/47x, VMT 1xx

to which this declaration relates, are in conformity with the following directives, provided that they are used according to our instructions:

EU-directive 73 / 23 / EG
EU-directive 89 / 336 / EG
EU-directive 97 / 23 / EG (Modul H)

	DN<40	40	50	65	80	100	125	150	200	250
PN16	Art. 3§3	Art. 3§3	Art. 3§3	Cat. I	Cat. I	Cat. I	Cat. I	Cat. I	Cat. I	Cat. II
PN25	Art. 3§3	Art. 3§3	Cat. I	Cat. I	Cat. I	Cat. I	Cat. I	Cat. II	Cat. II	Cat. II
PN40	Art. 3§3	Cat. I	Cat. I	Cat. I	Cat. I	Cat. I	Cat. II	Cat. II	Cat. II	Cat. II
PN63	Art. 3§3	Cat. I	Cat. I	Cat. I	Cat. I	Cat. I	Cat. II	Cat. II	Cat. II	Cat. II
PN100	Art. 3§3	Cat. I	Cat. I	Cat. I	Cat. I	Cat. I	Cat. II	Cat. II	Cat. II	Cat. II

Classification acc. 97 / 23 / EG , fluid group II.

Applied specifications: EN 50081/1+2, EN 50082/1+2, EN 61010

Control of the quality assucance system: Bureau Veritas S.A. Paris
No: 0062

Place, Date:
Speyer, July 2005

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